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# The Measurement Model of Health Physiology, Psychology and Sociology on Elderly Using Confirmatory Factor Analysis

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**ABSTRACT**

Increase in the number of elderly will need a serious handling because naturally elderly is experiencing setbacks, both physically and biology, or his mental. The increased number of elderly will also create health problems facing will be more complex especially related to the issue of aging. Efforts to produce a healthy aging population is not young and requires the cooperation of the parties. The purpose of this research examines the factors that affect the perception of the health of the elderly with logistic regression approach. The results of the study showed with CFA approach that the model of the measurement of the health of the elderly is the model fit and the indicator on the physical activity, aspects of psychology and social aspect is valid in convergence and discriminant and reliable. The greatest physical activity indicator is muscular strength, while aspects of psychology in a row is power remember and performance. The social aspects of the biggest indicators on changes interest.
**KEY WORDS:** Elderly, Health Physiology, Psychology, Sociology, CFA

## 1. INTRODUCTION

Elderly is the period of the cover in the amount of the life of a person that is the period in which the person has been depart far from the earlier period that is more enjoyable or depart from the full time benefits. Those who say the elderly are those who are aged more than 60 years [1]. The elderly generally experience various symptoms caused by the decline of biological functions, psychological, social and spiritual. This change will provide the influence on all aspects of the life of the elderly, including health [2].

According to the World Health Organization (WHO) population of elderly 2020 is estimated to reach 28,8 million people with an increase of approximately 11.3 4 and the age of the living hope 71.1 years [3]. The Central Statistics Agency population of elderly in Indonesia in 2010 rose to 9.7 % from the number of elderly it gave 23.9 million with age of living hope 66.2 %, 2013 has increased 6.6 % from the number of elderly 25 million, age living hope 69 years, while the number of elderly in East Java as much as the 4.113.847 or around 11 % of the total population of East Java.

Elderly reviewed from the physical aspect is the elderly who have undergone the process of aging the decrease of physical life that is marked with the more vulnerabilities of the body against the attacks of various diseases that can cause death, this caused along with the increase of the age of the changes occur in the structure and function of the cell, network and organ system [4]. On the psychological aspects of elderly power reduction remember, analytics or intelligence in processing information. The older people generally tend to be weak in memngingat new things learned and vice versa their memory good enough against the things that had long been studied. This is caused by the fact that they are not motivated to mengingatingat something, the lack of attention, hearing that less clearly and what he hears is different from the one spoken [1][5]. From the point of view of social, elderly is a separate social groups. In Western countries, elderly occupied social strata under the youth. For the people of traditional Asian, elderly occupied a high social class that must be respected by the community. [6] presents one of the results of research shows that 57 percent of respondennya feel religion is more meaningful for them after the pension than ever before. Another research shows that, 67-71 percent of elderly women and 52-55% in men say that religion is very important in his life, 5 percent of women and 7- 19% men say that religion does not mean much for them. From some research results indicate that religiosity increased in line with the age of the person. Further said that in some research results, confidence and trust in the Lord will alleviate the suffering when people experience sorrow, lonely, desperation or other emotional problems, in with their proximity to God can strengthen the faith and strength in each of the people (religiosity, the existence of the couple and social welfare on Elderly Binan PMI Branch Semarang.

Based on the research done by [7], titled psychological well-being and Health found that well-being has implications on the physical health. Declining physical abilities that cause various diseases and functional disorders in the elderly is not only affecting the physical condition but will affect the condition of psychological. Research Results [8], find that the elderly residents of the orphanage is very poor conditions in various aspects such as physical and psychological health, adjustments themselves and social and independence is very low. This generally means the elderly residents of the orphanage have differences with the elderly who live with the family.

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According to [9], various physical problems in the elderly are not only physical impact on the elderly but also have an impact on the physical elderly to appear some psychological problems such as anxiety, depression, insomnia, paranoid and dementia. Decline in physical function and disease suffered by the elderly cause elderly need other people to help in doing daily activities. Other problems can be derived from the social aspects and psychological aspects or emotional.

In the life of the elderly in order to maintain a healthy physical condition, it needs to be adapted to the needs of the physical needs with psychological or social conditions, so that would be no effort to reduce activities that are physical memforsir. A senior citizens must be able to set the way of life with good, for example eat and sleep rest and work in a balanced. Health education to the community, the administrator of the orphanage werdha elderly rehabilitation center managers about the importance of the independence of the elderly must always be improved. Elderly that healthy and independent will improve the quality of life of the elderly [6]. One of the ways that can be done by the elderly to face the problems is to achieve psychological kesejateraan. Social support refers to the comfort, attention, Aliansi Jurnalis Independen, or assistance given by another person or group to the individual. Nurses can play to help the elderly in the search for meaning and help elderly in spiritual practices [10]. Lead a spiritual activity to understand the meaning of each of the rituals and still soulful positive.

Based on explanation above, this research examines the relationship of indicators physical abilities, psychological and social between the elderly using confirmatory factor analysis (CFA) [11]. According [12], CFA is not a method to find the structure of the factor, but confirm the existence of the structure of the specific factors. One of the advantages of CFA is flexibility level when applied in a model of a complex hypothesis. Estimation method in CFA used maximum likelihood which can determine the optimum value on the factor loading [13].

## 2. METHODOLOGY

The population in this research is the elderly in Surabaya City. Sample in research as much as 206 senior citizens in the coastal areas: Sub-districts Kenjeran and Panti Wreda: Hargo Dedali, UPT Liponsos Whitish with a method simple random sampling [14]. The latent variable in this research is the physical activity (X1), aspects of psychology (X2), the social aspects of (X3) [15]. The framework of the concept of the relationship between the latent variables served as follows.

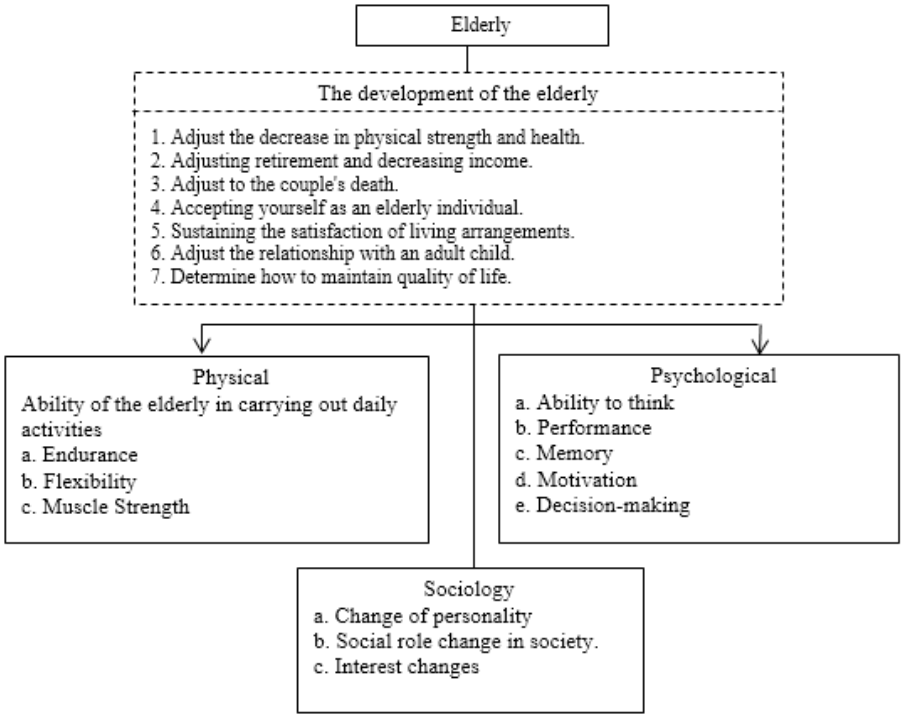


**Figure 1. The Conceptual Framework the perception of the health of the Elderly [5] [9] [15]**

The Data in this research using primary data through the survey. Furthermore done analysis with the method CFA. The basic principles of Confirmatory Factor Analysis is started by confirming a number of factors (the dimension of the problem) and then to each of the dimensions investigated in depth using some theoretical indicators that have the support of the theory of the strong and to test a theory or the concept of a process or a phenomenon

The measurement model of the factors presented in the picture below.

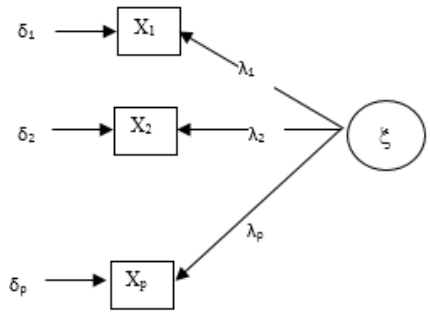


**Figure 2. Measurement Model for Single Latent Variabel**

In the form of a matrix can be written as:

$$\mathbf{X} = \mathbf{\Lambda_x}\, \boldsymbol{\xi} + \delta \qquad (1)$$

where:

**X** : matrix indicator variable
$\mathbf{\Lambda}_x$ : matrix lambda (loading factor)
$\boldsymbol{\xi}$ : matrix of the latent variable
$\delta$ : error

Suppose a latent variables can be measured by two indicators (p=2), there will be a form of equality as follows:

$$X_1 = \lambda_1\, \xi + \delta_1 \;\; ; \quad X_2 = \lambda_2\, \xi + \delta_2 \qquad (2)$$

To know whether the indicator variable is really valid in measuring the factors or construct so that explains the dimensions of the factors done with the test statistics t. The use of t tests is due to the loading factor ($\lambda_i$) in confirmatory factor analysis using standardized estimate as massive regression [12]. The hypothesis that is used is as follows:

$H_0 : \lambda_i = 0$ (loading factor is not significant in measuring the latent variable)
$H_1 : \lambda_i \neq 0$ (loading factor significant in measuring the latent variable)
where i = 1, 2, ..., p is indicator variable.test statistics for loading factor is.

$$t = \frac{\hat{\lambda}_i}{\hat{S}(\hat{\lambda}_i)} \qquad (3)$$

Where :

$\hat{\lambda}_i$ : estimator loading factor

$$\hat{S}(\hat{\lambda}_i) = \sqrt{\frac{\hat{\sigma}^2}{\sum_{i=1}^{n}(X_i - \bar{X}^2)}}$$

$\hat{\sigma}^2$ : Varians of observation variable X

When $|t| > t_{\alpha,df}$ then reject $H_0$ and estimation of relationship causal parameters (regression coefficient) significant in measuring the relationship of causation is so formed by unidimension.

## 3. RESULTS AND DISCUSSION

Variable frequency distribution research, namely the perception of the health of the elderly, health physical, psychological, social relations and the environment is presented in the following table.

**Table 1. Description of the research Variables**

| Latent Variable (indicator) | Mean | Standard deviation |
|---|---|---|
| **Physical Health** | | |
| **X1.1 (durability)** | 3.7788 | .89323 |
| **X1.2 (malleability)** | 3.5356 | .83633 |
| **X1.3 (muscular strength)** | 3.4173 | .86478 |
| **Aspects of Psychology** | | |
| **X2.1 (ability to think)** | 3.6982 | .66448 |
| **X2.2 (performance)** | 3.7654 | .72776 |
| **X2.3 Power (remember)** | 3.8350 | .65953 |
| **X2.4 (motivation)** | 3.9912 | .63046 |
| **X2.5 (decision making)** | 3.7240 | .61608 |
| **Social Aspects** | | |
| **(X3.1 Personality changes)** | 3.9238 | .64533 |
| **X3.2 (social change in society)** | 3.9668 | .66932 |
| **X3.3 (changes interest)** | 3.7477 | .64789 |

Table 1 shows that a good physical health more perceptions of the health of the elderly in a positive (94.3%), a good psychological more have elderly health perception of positive (80.6%), a good social relationship more have elderly health perception of positive (86.3%), and good environment more have elderly health perception of positive (90.0%).

Physical health relationship, psychology, social and environmental relationship with the perception of the health of the elderly is done with validity convergence, validity discriminant and reliability. The results of analysis presented in the following table.

**Table 2. Convergence validity and reliability of the indicators on physical activity, aspects of Psychology, Social Aspects**

| Latent Variable | Indicators | Validity Convergence | | | Reliability | | | *Composite Reliability* |
|---|---|---|---|---|---|---|---|---|
| | | *Loading Factor* | P-value | Description | *Error Variance* | P-value | Description | |
| **Physical Activity** | X1.1 (durability) | 0.736 | 0.000 | Valid | 0.364 | 0.000 | Reliabel | 0.780 |
| | X1.2 (malleability) | 0.661 | 0.000 | Valid | 0.392 | 0.000 | Reliabel | |
| | X1.3 (muscular strength) | 0.761 | 0.000 | Valid | 0.313 | 0.000 | Reliabel | |
| **Aspects of Psychology** | X2.1 (ability to think) | 0.551 | 0.000 | Valid | 0.306 | 0.000 | Reliabel | 0.866 |
| | X2.2 (performance) | 0.828 | 0.000 | Valid | 0.166 | 0.000 | Reliabel | |
| | X2.3 Power (remember) | 0.830 | 0.000 | Valid | 0.134 | 0.000 | Reliabel | |
| | X2.4 (motivation) | 0.809 | 0.000 | Valid | 0.137 | 0.000 | Reliabel | |
| | X2.5 (decision making) | 0.585 | 0.000 | Valid | 0.248 | 0.015 | Reliabel | |
| **Social aspects** | X3.1 (Personality changes) | 0.691 | 0.000 | Valid | 0.217 | 0.000 | Reliabel | 0.839 |
| | X3.2 (social change in society) | 0.604 | 0.000 | Valid | 0.283 | 0.000 | Reliabel | |
| | X3.3 (changes interest) | 0.858 | 0.000 | Valid | 0.110 | 0.000 | Reliabel | |

Table 2 shows that all indicators in each latent variable are valid and reliable. This is shown in the loading value which is all more than 0.5 and also of the p-value value of the validity convergence and reliability is smaller than $\alpha = 0.05$. Furthermore, the reliability of each latent variable can also be said reliably, it is shown from the value of composite reliability greater than 0.7. The X1.3 (muscular strength) (0.761) and X1.1 (durability) (0.736) indicator are the dominant formers of the latent variable Physical Activity, whereas in Aspects of Psychology the dominant shaper of the X2.3 Power (remember) (0.830), X2.2 (performance) (0.828), and X2.4 (motivation) (0.809) indicator. For social aspect, X3.3 (changes interest) is the dominant form of 0858.

**Table 3. Validity Discriminant on Physical Activity, Aspects Psychology, Social Aspects**

| Covariance | Discriminant Validity | | | | |
|---|---|---|---|---|---|
| | Estimator | Standard Error | Critical Ratio (CR) | p-value | Description |
| **Physical activity with aspects of Psychology** | .014 | .020 | .719 | .472 | Valid |
| **Psychological aspects with social aspects** | .054 | .038 | 1.429 | .317 | Valid |
| **Physical activities with social aspects** | .097 | .072 | 1350 | .298 | Valid |

Table 3 shows that the estimated value of covariance between Physical activity with aspects of Psychology is 0.014 with p-value of 0.472, between Psychological aspects with social aspects of 0.054 with p-value of 0.317, and between Physical activities with social aspects of 0.097 with p- value of 0.298. This shows the relationship between the latent variables Physical activity, the aspects of Psychology and social aspects give p-value greater than $\alpha = 0.05$, and this can be said that the assumption of discriminant validity has been met.

Diagram of the relationship between the latent variable in detail is presented in the following figure.

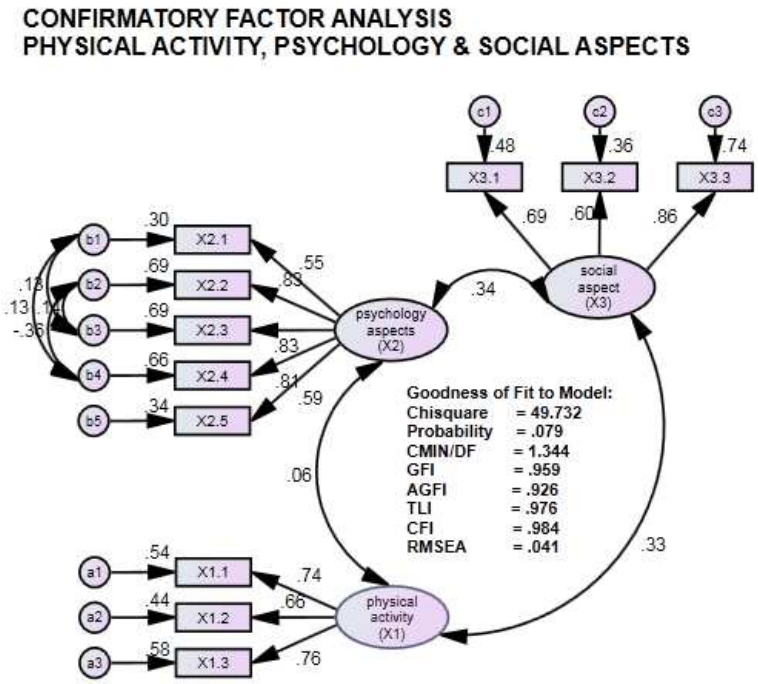


**Figure 3. The Relationship of physical activity, Psychology and Social Aspects**

**Goodness of Fit Model of the Measurement of Health Elderly**

The results of the measurement model testing with AMOS program in detail can be seen in the following table:

**Table 4. Results Model Testing Measurement of Health Elderly**

| The criteria | Cut – Off Value | Results | Description |
|---|---|---|---|
| **Chi - Square** | expected small | 49.732 | $\chi^2$ with df 37 is 52.192 Good |
| **Probability** | ≥ 0.05 | 0.079 | Good |
| **RMSEA** | ≤ 0.08 | 0.041 | Good |
| **GFI** | ≥ 0.90 | 0.959 | Good |
| **AGFI** | ≥ 0.90 | 0.926 | Good |
| **CMIN/df** | ≤ 2.00 | 1.344 | Good |
| **TLI** | ≥ 0.95 | 0.976 | Good |
| **CFI** | ≥ 0.95 | 0.984 | Good |

Figure 3 and Table 4 showed that the 8 (eight) criteria used to assess worthy / or not a good model it states. It can be said that the measurement model for the validity and discriminant convergen acceptable, which means there is a similarity between the model with data.

## 4. CONCLUSION

The results of the study showed with CFA approach that the model of the measurement of the health of the elderly is the model fit and the indicator on the physical activity, aspects of psychology and social aspect is valid in convergence and discriminant and reliable. The greatest physical activity indicator is X1.3 (muscular strength), while aspects of psychology in a row is X2.3 (power remember) and X2.2 (performance). The social aspects of the biggest indicators on X3.3 (changes interest).

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